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In vitro activity of eight antimicrobial agents against non-penicillinase-producing gonococci isolated in Munich

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SUMMARY The susceptibility of 119 strains of *Neisseria gonorrhoeae* isolated in Munich in 1986 to eight antibiotics was assessed. Although some degree of resistance to penicillin and tetracycline, as well as high minimum inhibitory concentrations (MIC) of spectinomycin, were observed, all the strains were sensitive to ciprofloxacin, enoxacin, fleroxacin, cefotaxime, and FCE 22250.

The effective treatment of gonorrhoea has become more difficult because gonococcal strains have become resistant to various antimicrobial agents. Such resistance has developed as a result of either chromosomal mutations or the acquisition of plasmids coding for resistance to antibiotics such as penicillin or tetracycline.[1] Continued surveillance of gonococcal populations for their susceptibility or resistance to antibiotics is therefore necessary if clinicians are to be able to make rational decisions concerning their choice of treatment for patients with gonorrhoea. Effective single dose treatment for gonorrhoea is also clinically desirable. In this study we have therefore examined the sensitivity of gonococci isolated in Munich during 1986 to eight antimicrobial agents.

Materials and methods

During 1986 we isolated 137 strains of *Neisseria gonorrhoeae* (including two penicillinase producing strains) at the Ludwig-Maximilians Universität. We studied 119 of these strains (all non-penicillinase-producers) by measuring minimum inhibitory concentrations (MICs) with an agar dilution method using GC agar base (Difco) supplemented with 1% IsoVitalex (BBL) as described previously.[2] A multipoint inoculator was used to deliver inocula of about 10^5 colony forming units a spot, and the plates were examined after incubation at 37°C for 24 hours in an atmosphere of 5% carbon dioxide in air. The antimicrobial agents used were penicillin (Glaxo), tetracycline (Lederle), spectinomycin (Upjohn), ciprofloxacin (Bayer), enoxacin (Goedecke AG), fleroxacin (Hoffman La Roche), cefotaxime (Roussel), and the rifamycin, FCE 22250 (Farmitalia Carlo Erba).

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Results

The table shows the in vitro activity of each of the antimicrobial agents against the *N gonorrhoeae* strains. As can be seen, a proportion of the strains showed some degree of resistance to penicillin, tetracycline, and spectinomycin. Seven (6%) strains were considered resistant (MIC $\geqslant$ 1 mg/l), 73 (61%) showed an intermediate level of resistance (MIC 0·125–0·5 mg/l), and only 39 (33%) were regarded as fully sensitive (MIC $\leqslant$ 0·064 mg/l) to penicillin. Eight (7%) strains showed low level resistance to tetracycline (MIC $\geqslant$ 1·0 mg/l), whereas 104 (87%)

Table *Minimum inhibitory concentrations (MICs) of eight antimicrobial agents against 119 strains of Neisseria gonorrhoeae*

	MIC (mg/l)		
Antimicrobial agent	*Range*	*MIC 50*	*MIC 90*
Penicillin	0·016 – 1·0	0·125	0·5
Tetracycline	0·00025– 2·0	0·25	0·5
Spectinomycin	16·0 –64·0	64·0	64·0
Ciprofloxacin	0·002 – 0·016	0·004	0·008
Enoxacin	0·032 – 0·25	0·125	0·125
Fleroxacin	0·002 – 0·032	0·016	0·016
Cefotaxime	0·00025– 0·032	0·004	0·016
FCE 22250	0·016 – 0·125	0·064	0·125

strains showed MICs of spectinomycin of 64 mg/l. The other five antibiotics all exhibited good in vitro activity against the gonococci tested.

Discussion

The findings regarding penicillin were similar to those reported recently from London,[3] except that the distribution of MICs of penicillin against the strains tested in the present study showed a single peak, as opposed to the bimodal distribution usually seen. Although the MIC 50 and MIC 90 values for spectinomycin appeared to be high, this finding was consistent with the previously observed high MICs of spectinomycin against gonococci isolated in Munich in 1984 and 1985 (H Korting, unpublished observations). The results obtained with the quinolones ciprofloxacin, enoxacin, and fleroxacin confirm the findings of other workers.[4,5] In addition, the strains remained sensitive to cefotaxime despite increased resistance to penicillin. The activity against gonococci of FCE 22250 has not been reported previously.

These data confirm that, despite the relative absence of penicillinase producing gonococci, penicillin is not the first line drug for treating gonorrhoea in Munich. For the past two decades spectinomycin has been used as first line treatment for gonorrhoea, but the gradual increase in resistance of gonococci to this drug clearly indicates that its efficacy will require close monitoring. In the event of resistance of gonococci to spectinomycin becoming a clinical problem, the use of alternative drugs such as the quinolones or other drugs with high activity against gonococci may need to be considered.

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